

REMARKS

Favorable reconsideration of this application is respectfully requested in view of the amendments above and the following remarks. By virtue of the amendment, claims 1-16 are pending in the present application of which claims 1, 5, 8, 11, and 14 are independent and claims 14-16 are new.

Claims 1, 2, 5, 8, and 9 were rejected under 35 U.S.C. § 102(e) as being anticipated by Bracha et al. (6,601,114). Claims 3, 4, 6, 7 and 10-13 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Bracha et al. in view of Levy et al. (6,092,147). The above rejections are respectfully traversed for at least the reasons set forth below.

Drawings

The Office Action Summary did not indicate whether the drawings filed on June 1, 2001 are accepted. The Applicants request that the Examiner indicate in the next office action whether the drawings are accepted.

Information Disclosure Statement

At the outset, the indication that the references cited in the IDS filed on June 1, 2001, have been considered is noted with appreciation.

Claim Rejection Under 35 U.S.C. §102

The test for determining if a reference anticipates a claim, for purposes of a rejection under 35 U.S.C. § 102, is whether the reference discloses all the elements of the claimed combination, or the mechanical equivalents thereof functioning in substantially the same way

to produce substantially the same results. As noted by the Court of Appeals for the Federal Circuit in *Lindemann Maschinenfabrick GmbH v. American Hoist and Derrick Co.*, 221 USPQ 481, 485 (Fed. Cir. 1984), in evaluating the sufficiency of an anticipation rejection under 35 U.S.C. § 102, the Court stated:

Anticipation requires the presence in a single prior art reference disclosure of each and every element of the claimed invention, arranged as in the claim.

Therefore, if the cited reference does not disclose each and every element of the claimed invention, then the cited reference fails to anticipate the claimed invention and, thus, the claimed invention is distinguishable over the cited reference.

Claims 1, 2, 5, 8, and 9 were rejected under 35 U.S.C. § 102(e) as being anticipated by Bracha et al.

Claim 1 recites,

a code verifier configured to analyze instructions of said program and to generate a plurality of type signatures based on said instructions, each of said type signatures indicating each input type constraint and each output type description for a respective one of said instructions, wherein said code verifier is configured to detect a type error by analyzing said type signatures.

Bracha et al. fails to teach or suggest (1) generating a plurality of signatures based on said instructions, (2) each type signature indicating each input type constraint, and (3) each type signature indicating each output type description for a respective one of said instructions.

Brach et al. discloses lazy linking with module-by-module verification. Brach et al. discloses in the description of related art that linking is the process of taking a class at run time and combining it with a virtual machine (VM) so the module can be executed. Lazy linking loads a class, *e.g.*, an instance of a module, only at the time the class is first necessary

to execute an instruction of the class. Verification is performed every time the class is linked. Verification ensures that illegal operations are not attempted by a VM that can lead to meaningless results. See column 4, lines 28-53. However, in certain instances, when a class is referenced by another class, the class may be verified even if it is not used. Also, verification is performed at run time, so a class that has been previously verified is verified again each time the class is loaded. See column 5, lines 17-28. Thus, Brach et al. discloses a pre-runtime, class-by-class, verification process. In Bracha's pre-run time, verification process of a class, any intermodule information referencing other modules, such as subtyping relationships between classes, is assumed so that instructions in the class being verified are valid. However, the assumed information places a constraint on the referenced module that must be remembered by the VM. The pre-verification constraints are written to a file for checking later at run time. See column 16, line 45-column 17, line 28.

As cited in the rejection and further disclosed by Bracha et al., as a further option, the pre-verification constraints, *e.g.*, stored in a file, or the module itself can have an attached digital signature to reliably identify the source of the module or constraints. See column 17, lines 30-35. The digital signature of Bracha et al. is used to identify the source of the file containing the constraints or the module itself. For example, if the digital signature does not match the digital signature of a trusted source or entity, then the constraints or module may be considered unsafe to use. Thus, the digital signatures of Brach et al. are not generated based on the instructions. Instead, a digital signature of Bracha et al. is generated based on the identity of a source providing a module or file containing pre-verification constraints. Furthermore, the digital signatures of Bracha et al. do not indicate each input type constraint and each output type description for a respective one of each instruction. Instead, the digital

signatures only identify sources rather than input type constraints or output type descriptions of instructions. Accordingly, Bracha et al. fails to teach all the features of claim 1, and claims 1-4 are believed to be allowable.

As stated above, the digital signatures of Bracha et al.

Independent claim 5 recites,

a code verifier configured to analyze a code block of said program and to translate instructions within said code block into a plurality of type signatures, said code verifier further configured to compose said type signatures into a single composed type signature and to detect a type error by analyzing said type signatures.

Brach et al. fails to teach a code verifier configured to translate instructions within a code block into a plurality of signatures. As stated above, the digital signature disclosed in Bracha et al. identifies the source providing the module or file containing pre-verification constraints. Brach et al. fails to teach translating instructions into type signatures. Brach et al. also fails to teach composing a plurality of type signatures into a single type signature. In fact, the rejection of claim 11 states that Bracha does not explicitly disclose composing said type signatures into a single composed signature. The rejection of claim 11, then combines Levy et al. with Bracha et al. to allegedly teach this feature. Thus, the Examiner agrees that Bracha et al. fails to teach composing a plurality of type signatures into a single type signature. Accordingly, claims 5-7 are believed to be allowable.

Claim 8 recites features similar to claim 1, including,

generating a plurality of type signatures based on instructions within said program, each of said type signatures indicating each input type constraint and each output type description for a respective one of said instructions.

The digital signature of Bracha et al. is used to identify the source of the file containing the constraints or the module itself. The digital signatures of Brach et al. are not generated based on the instructions. Instead, a digital signature of Bracha et al. is generated based on the identity of a source providing the module or file containing the pre-verification constraints. Furthermore, the digital signatures of Bracha et al. do not indicate each input type constraint and each output type description for a respective one of each instruction. Instead, the digital signatures only identify sources rather than input type constraints or output type descriptions of instructions. Accordingly, Bracha et al. fails to teach all the features of independent claim 8, and claims 8-10 are believed to be allowable.

Claim Rejection Under 35 U.S.C. §103

The test for determining if a claim is rendered obvious by one or more references for purposes of a rejection under 35 U.S.C. § 103 is set forth in MPEP § 706.02(j):

To establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations. The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art and not based on applicant's disclosure. *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991).

Therefore, if the above-identified criteria are not met, then the cited reference(s) fails to render obvious the claimed invention and, thus, the claimed invention is distinguishable over the cited reference(s).

Claims 3, 4, 6, 7 and 10-13 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Bracha et al. in view of Levy et al.

Independent claim 11 recites, translating said instructions into a plurality of type signatures and composing said type signatures into a single composed type signature. These steps are not taught or suggested by either of Bracha et al. and Levy et al. As stated above, the digital signature of Bracha et al. is used to identify the source of the file containing the constraints or the module itself. The digital signatures of Brach et al. are not generated based on the instructions, and instructions are not translated to generate a plurality of signatures. Furthermore, neither Brach et al. nor Levy et al. teach or suggest composing a plurality of signatures into a single composed signature. Levy et al. was combined with Bracha et al. to allegedly teach this feature. However, Levy et al. also fails to teach or suggest this feature. The rejection cites column 7, lines 25-34 to tech this feature. In this passage, Levy et al. discloses generating a proof of authenticity for bytecode using any type of cryptographic computation, such as hashing. However, Levy fails to teach or suggest composing a plurality of type signatures into a single composed type signature, wherein the plurality of type signatures are translated from instructions. Thus, claims 11-13 are believed to be allowable.

Dependent claims 3, 4, 6, 7 and 10 are believed to be allowable for at least the reasons stated above that their respective independent claims are believed to be allowable. Furthermore, Bracha et al. in view of Levy et al. fails to teach or suggest many of the features of these claims, such as translating code blocks into type signatures, composing code type signatures for each code block into a single type signature, making a determination as to whether an input type constraint of a first type signature is acceptable to an output type description of a second type signature, and a type signature including a description indicative

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of a type of an input consumed by an instruction when the instruction is executed and another of type signature including a description indicative of a type of an output produced by another instruction when the other instruction is executed.

Newly Added Claims

Claims 14-16 are new. Claims 14-16 include features similar to claims 8-10 not taught or suggested by Bracha et al. or Levy et al. Accordingly, claims 14-16 are also believed to be allowable.

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Conclusion

In light of the foregoing, withdrawal of the rejections of record and allowance of this application are earnestly solicited.

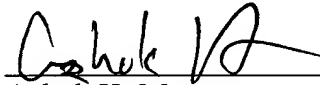
Should the Examiner believe that a telephone conference with the undersigned would assist in resolving any issues pertaining to the allowability of the above-identified application, please contact the undersigned at the telephone number listed below. Please grant any required extensions of time and charge any fees due in connection with this request to deposit account no. 08-2025.

Respectfully submitted,

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